

## **Brief update of Regional sea ice outlook for Greenland Sea and Barents Sea - based on data until the end of August 2011**

Sebastian Gerland<sup>1</sup>, Harvey Goodwin<sup>1</sup>, Angelika H.H. Renner<sup>1</sup>, and Nick Hughes<sup>2</sup>

1: Norwegian Polar Institute, 9296 Tromsø, Norway (E-mail: gerland@npolar.no;  
goodwin@npolar.no; angelika.renner@npolar.no)

2: Norwegian Ice Service, Norwegian Meteorological Institute, 9293 Tromsø (E-mail:  
nick.hughes@met.no)

The monthly mean sea ice extents for August 2011 based on Norwegian ice charts produced primarily from passive microwave satellite data, supplemented with high resolution SAR imagery since 2007, are compared with the corresponding monthly means for August for the years 2008-10 (Fig. 1), and with 30, 20, and 10 year averages for monthly means for the periods 79-08, 80-99 and 99-08 (Fig. 2).

### **August 2011 ice extent**

The ice extent in the western Greenland Sea in August 2011 was slightly larger than during the past three years (Fig. 1), with the ice edge off the Greenlandic east coast further south. In the central and eastern part of the Greenland Sea, ice extent was similar or slightly less than during the past three years. Comparisons with longterm means (Fig. 2) illustrate that August 2011 ice extent is larger in the western Greenland Sea than the recent decade means, but similar to longer term means. The area directly north of Svalbard August 2011 shows relatively little ice (west, north of Spitsbergen) or ice extent similar to previous years and decades (east, north of Nordaustlandet). In the Barents Sea in the area between Svalbard and Franz Josef Land, the ice edge was further north in August 2011 (means) than in the past three years and than in any of the decadal means. The area around Novaya Semlya appeared to be ice free in August 2011, as it was in the past three years.

### **Sea ice situation in Fram Strait, late August/early September 2011**

In Fram Strait scientists on a currently ongoing expedition of the Norwegian Polar Institute with RV "Lance" observed in a larger extent than earlier ice fields with rather small ice floes. Even so ice extent was observed similar or larger than average, ice concentration was often observed to be low in large parts, with open drift ice. Occurrence of large multiyear ice (MYI) floes was very rare. First preliminary results from helicopter-based regional electromagnetic sea ice thickness measurements show presence of mainly first year ice and only very little older and thicker MYI in the Fram Strait. The MYI fraction was slightly larger compared with the same time in 2010, but still very low.

### **Forecast**

The Norwegian Ice Service ice charts provide a record for the Svalbard area that extends back to 1967 (45 years). The ice charts use six categories for ice concentration: open water (0-10%), very open drift ice (10-40%), open drift ice (40-70%), close drift ice (70-90%), very close drift ice (90-100%), and fast ice (100%). Monthly average area values for each of these

classes were calculated within a box extending from 72 to 85°N and 0 to 40°E. The sum of these values was then used as the average monthly ice area for our analysis.

During August the ice edge retreated north of the Svalbard archipelago, so that circumnavigation of all the islands including Nordaustlandet was possible.

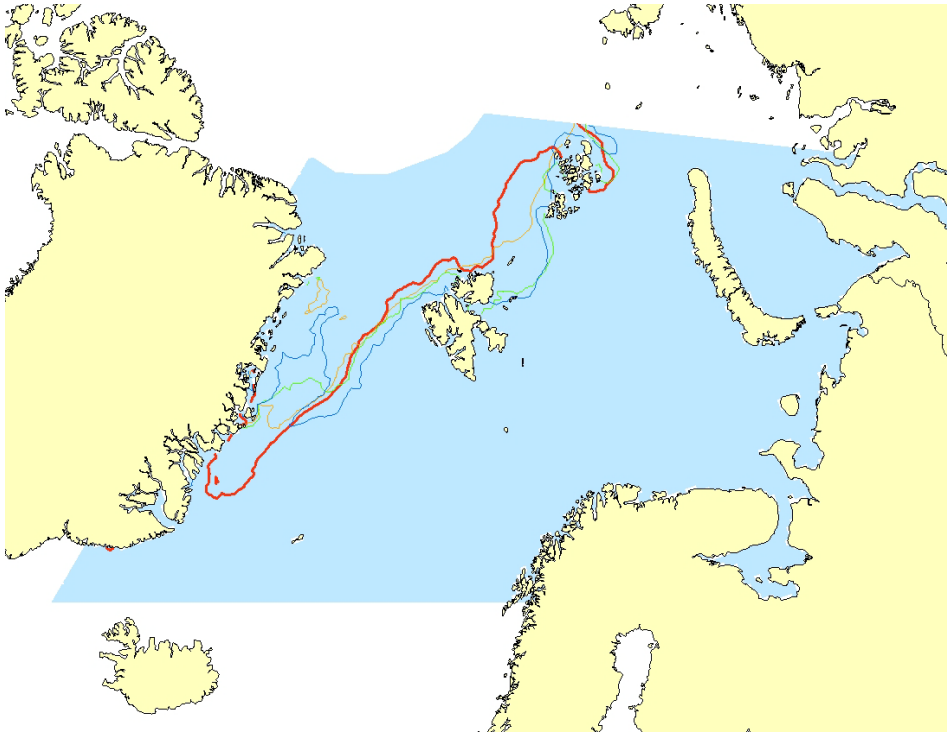
The forecast uses a simple statistical regression, using:

- ice extent from the ice charts,
- NOAA Extended Reconstructed Sea Surface Temperature (SST) V3b (<http://www.esrl.noaa.gov/psd/data/gridded/data.noaa.ersst.html>), and
- NWS Climate Prediction Centre (CPC) Arctic Oscillation Index ([http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily\\_ao\\_index/ao.shtml](http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/ao.shtml)).

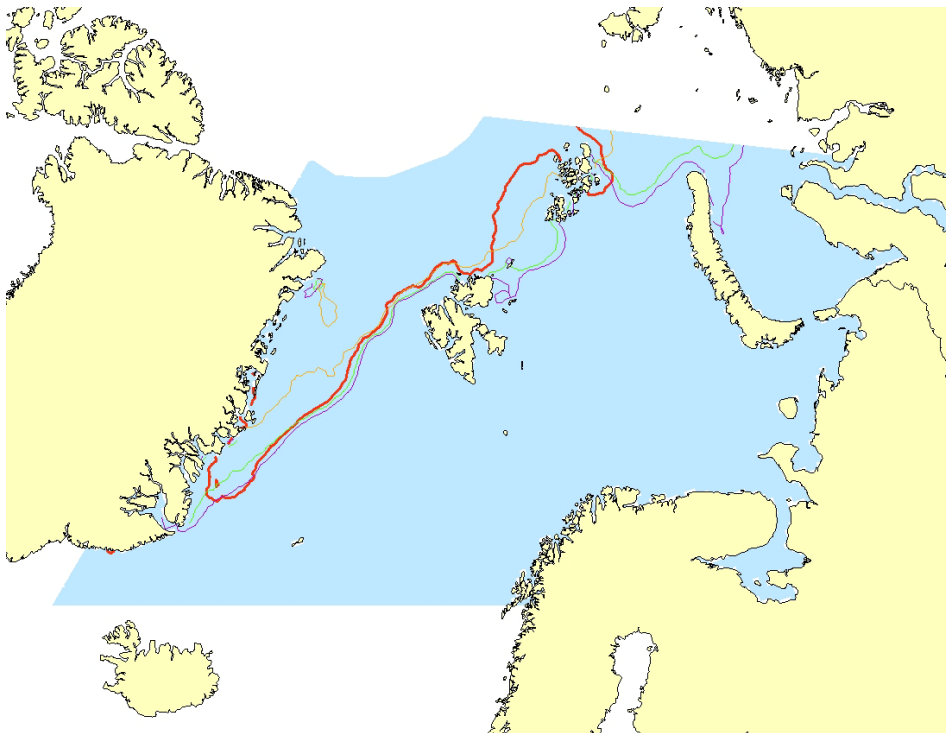
Monthly data to the end of August was used. For September ice extent, we find:

$$\begin{aligned} Ice_{September} = & 344121.1 && + (-58467.34 * AO_{March}) \\ & + (0.63551 * Ice_{August}) \\ & + (5251.85 * SST_{July}) \end{aligned}$$

Taking the values of 1.424, 208,562, and 5.07 for  $AO_{March}$ ,  $Ice_{August}$ , and  $SST_{July}$  respectively, we obtain a predicted average ice extent of 187,715 km<sup>2</sup>. This is now less than our predictions from July and August, and if correct would be less than the September average, and lower than the previous four Septembers. In the past 10 years this minimum has only been exceeded by 2001 and 2004, which were 175,265 and 152,188 km<sup>2</sup> respectively. At the time of this report update, the ice extent in the Svalbard area had not reached its minimum, with the latest extent on 9 September being 176,032 km<sup>2</sup>.



**Fig. 1:** Ice extent (monthly means, August) southern border of 30% ice concentration, in the Greenland Sea / Fram Strait and Barents Sea, based on passive microwave satellite data (red = August 2011, orange = August 2010, green = August 2009, blue = August 2008).



**Fig. 2:** Ice extent (monthly means, August) southern border of 30% ice concentration, in the Greenland Sea / Fram Strait and Barents Sea, based on passive microwave satellite data (red = August 2011, orange = mean August 1999-2008, purple = mean August 1980-1999, green = mean August 1979-2008).